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- 4.5.3 If the extent of corrosion cannot be determined, plans and scheduling for further investigation or the use of an internal inspection device shall be developed based on the severity of the corrosion encountered.
- 4.5.4 The internal condition of the pipelines shall be documented on the Pipeline Maintenance Report.

5.0 QUALIFICATION

5.1 Supervisor Qualification 195.555 and 192.453

- 5.1.1 Magellan Asset Integrity Supervisors shall be knowledgeable of Magellan corrosion control procedures, including but not limited to those for design, installation, operation, and maintenance of internal and external corrosion control systems.
- 5.1.2 Supervisors may be registered professional engineers, or persons recognized as corrosion specialists or cathodic protection specialists by NACE, and/or their professional activities include suitable experience in corrosion control.

5.2 Operator Qualification

- 5.2.1 Operator Qualification (OQ) is required for personnel to perform identified Covered Tasks. Refer to Operator Qualification (OQ) – Covered Tasks for more information.
- 5.2.2 Assets covered by the Mitigation Plan: All Corrosion related activities shall be applied under the direction of competent personnel trained in the field of corrosion control. Corrosion control data shall be reviewed by NACE certified corrosion personnel.

6.0 CORROSION CONTROL RECORDS 195.404 and 192.491

6.1 Records or maps shall be maintained to show the location of:

- 6.1.1 Cathodically protected pipelines
- 6.1.2 Cathodic protection facilities, including galvanic anodes, installed after January 28, 2002
- 6.1.3 Neighboring structures bonded to cathodic protection systems.

6.2 Records or maps shall be maintained showing a stated number of anodes, installed in a stated manner or spacing. Specific distances to each buried anode need not be shown.

6.3 Records shall be maintained of each analysis including root cause analysis, check, demonstration, examination, inspection, investigation, review, survey, and test required in sufficient detail to demonstrate the adequacy of corrosion control measures or that corrosion requiring control measures does not exist. These records shall be maintained for a minimum of 5 years.

6.4 All pipe to soil survey, rectifier inspection, and foreign line crossing pipe to soil potential data will be recorded in the appropriate corrosion control database. All close interval pipe to soil potential data will be recorded in a hard copy report as well as the appropriate electronic format, atmospheric inspection data and exposes pipe visual inspection data will be documented on the appropriate forms and distributed appropriately, and will feed into and be processed in overall LPSIP by populating appropriate portions of the relative risk model.

6.5 As long as the pipeline remains in service, records shall be maintained for:

- 6.5.1 Exposed portions of buried pipelines
- 6.5.2 Cathodic protection surveys, including close interval or comparable surveys
- 6.5.3 Internal corrosion coupon examination records and records of internal examination of removed pipe

7.0 INTEGRITY MANAGEMENT PLAN INTEGRATION

7.1 In accordance with the Integrity Management Plan, the Pipeline Risk Engineer will conduct

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integrated analysis with the External Corrosion Control Program Manager and/or SMEs to ensure effective integration of data, recommendations, and/or program enhancements identified during risk assessments and analysis.

- 7.2 Recommendations or process changes identified by the External Corrosion Control Program Manager and/or SMEs as a result of the integrated analysis will be communicated to and discussed with Pipeline Risk Engineer in accordance with the Magellan IMP.
- 7.3 Mitigation measures or process changes conducted by the External Corrosion Control Program Manager and/or SMEs as a result of the integrated analysis will be communicated to and discussed with Pipeline Risk Engineer in accordance with the Magellan IMP.
- 7.4 Whenever a line is added or removed from the Corrosion Control Program or elements of the Corrosion Control Program (i.e. External, Internal, Atmospheric), the Pipeline Risk Analyst shall be notified in order to update the Risk Assessment Model. All pipelines included in the Corrosion Control Program shall be maintained in accordance with the program guidelines and criteria. Corrosion Control records or data from new construction or pipeline acquisition activities shall be entered into the Corrosion Control database within one year. Pipelines not included in the program are not maintained in accordance with the program and as such, corrosion can be expected. See Inactive Pipelines and Abandoning Pipeline Segments for more details.

8.0 DEFICIENCIES IN CORROSION CONTROL

- 8.1 Deficiencies in Corrosion Control shall be corrected in a reasonable time.
 - 8.1.1 Unless otherwise specified in this program, a reasonable time to correct deficiencies is defined as by the next scheduled inspection.
 - 8.1.2 In the case where deficiencies cannot be complete by the next scheduled inspection; planning, scheduling, progress, assessment, testing, monitoring, and/or other process that demonstrates that the threat in being addressed in a prudent and practical manner may be utilized until such time the deficiency has been resolved.
 - 8.1.3 A cause analysis will be performed to identify contributing factors and root causes of anomalies/deficiencies identify by corrosion control surveys.

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System Integrity Plan Change Log

Date	Change Location	Changed By	Approved By	Brief Description of Change
10/08/02	1.1, 1.2	Rick Wooldridge	Michael Pearson	Revised regulation number 192.461 to 192.452.
	1.1.1	Rick Wooldridge	Michael Pearson	Replaced "newly buried" with "jurisdictional, newly constructed, relocated, replaced or otherwise changed."
	1.2.1	Rick Wooldridge	Michael Pearson	Added: "including newly constructed, relocated, replaced or otherwise changed pipelines."
11/20/02	1.6.1	Rick Wooldridge	Michael Pearson	Added "Pertinent survey information shall be recorded in the Cathodic Protection Data Manager (CPDM) within 30 days after the survey."
	1.6.3, 1.71, 1.81	Rick Wooldridge	Michael Pearson	Added: "within 30 days after the survey."
05/06/03	1.9.4.2	Rick Wooldridge	Michael Pearson	Removed wording related to "metallic" or "electrolytic" type of short.
	1.9.4.3	Rick Wooldridge	Michael Pearson	Added wording related to specific requirements for 192
	1.10.3	Rick Wooldridge	Michael Pearson	Removed references to "permanent reference cells."
	2.1.2	Rick Wooldridge	Michael Pearson	Changed "39" months to "36" months to align with 192 regulations.
05/16/03	5.0	Rick Wooldridge	Michael Pearson	Added 5.0, Integrity Management Plan Integration.
6/13/03	2.1.3	Rick Wooldridge	Michael Pearson	Added 2.1.3 Breakout Tanks shall be inspected.....
10/1/03	1.2.1, 1.6.1	Rick Wooldridge	Michael Pearson	Changed "Manager of Pipeline Integrity" to "Manager of Asset Integrity to reflect title changes.
10/1/03	2.1.1	Rick Wooldridge	Michael Pearson	Deleted entire paragraph "On Jurisdictional facilities each pipeline that is exposed..." The criteria for coating are depicted in the new 2.13.
10/1/03	2.1.3	Rick Wooldridge	Michael Pearson	Added, "A suitable coating shall be applied to all soil-to-air interface areas to prevent atmospheric and electrolytic corrosion damage. Refer to Coatings – Selection, Applications and Maintenance." in order to clarify the coating criteria. Added, "A suitable coating shall be applied to all aboveground facilities to prevent further atmospheric corrosion damage if, through the guidelines established in the Atmospheric Inspection Procedure, a Rust Rating of 2-G or worse is identified. Refer to Coatings – Selection, Applications and Maintenance." in order to clarify the coating criteria.
10/1/03	4.1.1	Rick Wooldridge	Michael Pearson	Changed "Williams Pipeline Integrity Supervisors" to "Magellan Asset Integrity Supervisors" in order to reflect changes in title.
10/1/03	3.0	Rick Wooldridge	Michael Pearson	Inserted: Internal Corrosion Program
10/1/03	6.1, 6.2, 6.3	Rick Wooldridge	Michael Pearson	Changed "risk engineer" to "Pipeline Risk Engineer" in order to reflect changes in title and clarify implied responsibilities (i.e. pipeline vs facility)
11/30/03	1.2.3	Rick Wooldridge	Michael Pearson	Added, "On jurisdictional facilities... cathodic protection system shall be provided within one year of completed construction".
11/30/03	1.5.2	Rick Wooldridge	Michael Pearson	Added, "Newly constructed facilities shall be included in and be managed in accordance with the <u>Magellan System Integrity Plan</u> ..."
11/30/03	2.5.3	Rick Wooldridge	Michael Pearson	Added, "On newly constructed facilities, corrosion personnel, qualified under the Operator Qualification Ruling or with NACE Certification, shall be utilized to identify, mitigate, and monitor for inadequate cathodic protection and detrimental interference currents, prior to and during construction. Refer to Section 1.8, Foreign Crossings and Interference Currents below."
11/30/03	1.6.5	Rick Wooldridge	Michael Pearson	Added entire section related to CIS
11/30/03	1.11.4	Rick Wooldridge	Michael Pearson	Deleted, "The external condition of the pipelines shall be reported on Form 02-LEG-1035 – Encroachment Agreement (Short Form), Form 02-OPR-1581 –

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				Maintenance Report, or equivalent form."
12/1/03	1.0	Rick Wooldridge	Michael Pearson	Added Index and renumbered
12/1/03	9.0	Rick Wooldridge	Michael Pearson	Added Definitions
12/1/03	8.0	Rick Wooldridge	Michael Pearson	Added References
12/1/03	8.2	Rick Wooldridge	Michael Pearson	Deleted, "DETERMINING CORROSIVE PROPERTIES OF CARGOES IN PETROLEUM PRODUCTS PIPELINES"
12/1/03	8.2	Rick Wooldridge	Michael Pearson	Deleted, "Refer to Copper Strip Corrosion by Liquefied Petroleum (LP) Gases."
12/1/03	8.2	Rick Wooldridge	Michael Pearson	Deleted, "and Field Gas Analysis For CO ₂ , H ₂ S, O ₂ and Dew Point."
12/1/03	8.2	Rick Wooldridge	Michael Pearson	Deleted, "NOTE: Corrosivity of liquid products (refined petroleum products and natural gas liquids) is rarely evaluated"
12/1/03	8.2	Rick Wooldridge	Michael Pearson	Deleted, "Corrosive gas shall not be transported by pipeline,considered to be potentially corrosive."
12/1/03	4.6	Rick Wooldridge	Michael Pearson	Rewrite to be consistent with External Examination
3/23/04	4.4.2	Rick Wooldridge	Michael Pearson	Added: Effectiveness of inhibitor will be based on the inhibitors success.. typically <1 MPY for refined products.
3/23/04	4.4.3	Rick Wooldridge	Michael Pearson	Added: Internal corrosion rates greater than >1 MPY on inhibited pipelines.....engineering judgment.
6/5/2004	3.1.1	Rick Wooldridge	Michael Pearson	Note: Atmospheric corrosion inspections on exposed pipelines may be conducted visually or through the use of an in-line inspection device capable of identifying and sizing corrosion.
11/5/2004	2.2.2, 2.6.3	Rick Wooldridge	Michael Pearson	Modified for clarification: Noted conditions that will cause compliance with 651 to not be observed may be but are not limited to tanks set on concrete, asphalt pads or where studies conducted in accordance with API 653 indicate that corrosion will not affect the safe operation of the tank.
11/30/2004	2.9.4.1	Rick Wooldridge	Michael Pearson	Replaced "shall" with "may" for 195 lines and added the 192 language.
1/3/05	3.3.1	Rick Wooldridge	Michael Pearson	Deleted: Operate Auto-Injection Pumps, Added: Internal Corrosion Remediation
1/3/05	3.4.4	Rick Wooldridge	Michael Pearson	Replaced reference to OJT with "Refer to Coupon Handling and ER Probes" for more information.
1/3/05	3.4.4	Rick Wooldridge	Michael Pearson	Reviewed the procedure for accuracy and effectiveness.
4/7/05	Overall	Rick Wooldridge	Michael Pearson	Minor modification and editorials added to provide clarification...no process changes.
5/16/05	1.9.4.3	Rick Wooldridge	Michael Pearson	Added: "Note: For line sections integrity tested by hydrostatic test a risk evaluation will be conducted at each shorted casing and action taken to clear the short and/or mitigate the corrosion if deemed necessary."
7/6/05	1.12	Rick Wooldridge	Michael Pearson	Added: Basic SCC awareness information is available to operation and maintenance employees in Stress Corrosion Cracking Information.
7/6/05	1.12	Rick Wooldridge	Michael Pearson	Added: In the event that a pipeline system has experienced one or more confirmed incidents of SCC a systematic identification and examination of other potential locations of SCC will be conducted based upon the observations of conditions associated with the confirmed SCC incident.
7/6/05	1.12	Rick Wooldridge	Michael Pearson	Added: or any other locations identified for SCC investigation.
7/6/05	1.12	Rick Wooldridge	Michael Pearson	Added: Pipe cutouts sent to a metallurgical lab for analysis will be investigated for SCC. Results of this analysis will be provided in a comprehensive report provided to Asset Integrity. Added: SCC examinations will be performed by a NDE Technician trained in the detection of SCC on buried pipelines and will be documented in the Pipeline Maintenance Report.
7/6/05	1.12	Rick Wooldridge	Michael Pearson	Added: Annually, confirmed SCC occurrences will be reviewed to determine if changes to the SCC assessment criteria are necessary.
8/1/05	1.12	Rick Wooldridge	Michael	No confirmed SCC occurrences to review.

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			Pearson	
11/7/05	All	Rick Wooldridge	Michael Pearson	Added LPP Mitigation and Shell CD requirements.
11/7/05	3.3.2	Rick Wooldridge	Michael Pearson	Added cleaning pig requirements.
12/14/05	3.5.2	Rick Wooldridge	Michael Pearson	Added "circumferentially and longitudinally"
1/4/06	1.13, 7.13	Rick Wooldridge	Michael Pearson	Added MIC related information to the program.
03/06/06	2.9.4.3	Rick Wooldridge	Michael Pearson	Deleted "clear the short and/or" mitigate the corrosion ...
4/6/2006	3.2.1	Rick Wooldridge	Michael Pearson	Added: Refer to Coatings – Selection, Applications, and Maintenance for more information.
4/6/2006	2.13.1	Rick Wooldridge	Michael Pearson	Replaced "incidents" with "discoveries" and added "injurious".
4/6/2006	4.4.1	Rick Wooldridge	Michael Pearson	Replaced "Internal Corrosion Remediation" with "Auto Injection Pumps".
9/8/2006	8.0, 10.0	Rick Wooldridge	Michael Pearson	Section 8 - Deficiencies in Corrosion Control was added and references to "as soon as practical" were removed from the document. Section 10 – Definitions was update to include "reasonable time".
9/8/2006	ALL	Rick Wooldridge	Michael Pearson	Reviewed entire document...minor editorial changes, no process changes.
10/26/2006	2.3.4.2, 2.3.6	Rick Wooldridge	Michael Pearson	Removed references to Net Protective current criteria
11/30/06	TOC	Rick Wooldridge	Michael Pearson	Added 2.14 - AC Corrosion
11/30/06	2.5.3	Rick Wooldridge	Michael Pearson	Changed "Section 1.8 to 2.8 "and added "2.14, Induced AC Corrosion" in the last sentence.
11/30/06	2.8.4	Rick Wooldridge	Michael Pearson	Added Section 2.8.4 "For interference currents related to AC....."
11/30/06	2.14	Rick Wooldridge	Michael Pearson	Added new Section – "2.14 Induced AC Corrosion" and subsections 2.14.1, 2.14.2 and 2.14.3
11/30/06	9.1	Rick Wooldridge	Michael Pearson	Added link to "Testing for Induced AC and Remedial Measures in Related Policies/Procedures
11/30/06	10	Rick Wooldridge	Michael Pearson	Added the definition for Induced AC Corrosion to Section 10 – Definitions
11/30/06 Deleted 12/7/09	3.2.4	Rick Wooldridge	Michael Pearson	Added: Longhorn Specific: A suitable coating shall be applied to all aboveground facilities and soil-to-air interface areas to prevent corrosion damage. All areas with signs of coating degradation and/or corrosion shall be coated/recoated. Refer to Coatings – Selection, Applications and Maintenance for more information.
4/25/07	2.1	David Stewart	Michael Pearson	Added 16 TAC 7.86(3) to regulation references.
4/25/07	2.1.6	David Stewart	Michael Pearson	Added "...using a coating deficiency (holiday) detector..."
4/25/07	2.1.9	David Stewart	Michael Pearson	Added new paragraph, "Joints, fittings, and tie-ins shall be coated with material(s) compatible with the coating(s) on the pipe." Old 2.1.9 reference to Coatings – Selection, Applications, and Maintenance becomes 2.1.10.
4/25/07	2.8	David Stewart	Michael Pearson	Added 16 TAC 7.86(5)(c) to regulation references.
4/25/07	2.8.4	David Stewart	Michael Pearson	Added new paragraph, "Texas Intrastate Pipeline specific: Whenever suspected areas of interference are identified, testing will be conducted within 6 months to determine the extent of interference, and appropriate action will be taken." Old 2.8.4 reference to AC testing becomes 2.8.5.
1/1/08	4.2.2	David Stewart	Rick Wooldridge	Added natural gas
1/15/08	2.6.4.1	David Stewart	Rick Wooldridge	Added paragraph requiring adequate levels in AST's when taking potential readings, as well as requirement to document the tank levels.
2/15/08	2.3.2	Rick Wooldridge	Larry Davied	Added: "Where injurious aerobic bacteria has been identified, or is suspected, a polarized potential of -.950 volts or more negative is required."
2/20/08	All	E7	Rick Wooldridge	2007 annual review
9/08/08	3.1.1	Rick Wooldridge	Larry Davied	Removed the note "or through the use of an in-line inspection device capable of identifying and sizing

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				corrosion...at the request of PHMSA
09/25/08	1.3	Rick Wooldridge	Larry Davied	Remove references to Shell's Consent Decree
09/25/08	All	E7	Rick Wooldridge	2008 annual review, no changes
11/06/08	4.3.2.3	Rick Wooldridge	Larry Davied	Pipelines transporting NH3 do not require routine pigging, but should be cleaning if excessive debris is identified and/or prior to In-line inspection tool runs.
11/16/09	All	E7	Rick Wooldridge	2009 annual review; Removed references to Longhorn
12/07/09	4.1.1	E7	Rick Wooldridge	Removed... Pipeline cargoes shall be periodically evaluated for corrosivity. Added: The corrosive effects of pipeline cargoes (hazardous liquids or carbon dioxide) shall be investigated.
12/07/09	4.1.2	E7	Rick Wooldridge	Added: Circumstance or condition [such as those listed below] that could cause, promote, or increase the likelihood of internal corrosion should be promptly reviewed and internal corrosion mitigation plans implemented as appropriate.
12/07/09	4.1.2.1 thru 4.1.2.11	E7	Rick Wooldridge	Added: 4.1.2.1 Type of commodity, 4.1.2.2 Flow rate, 4.1.2.3 Velocity, 4.1.2.4 Operating Pressure, 4.1.2.5 Topography, 4.1.2.6 Amount of foreign material and/or contaminants present in the pipeline and/or commodity stream such as sand, silt, water, or other materials that could cause or promote internal corrosion, 4.1.2.7 Amount of sulfur, salts, acids, hydrogen sulfide, carbon dioxide or other corrosive material present and corrosive effect based upon partial pressures of material in the pipeline 4.1.2.8 Presence of microbes, 4.1.2.9 Temperature, 4.1.2.10 Pipe configuration, design, and material specifications, 4.1.2.11 Operating conditions, including but not limited to, steady state conditions, slack line conditions, upset conditions in the pipeline system, and upset conditions in upstream facilities such as refineries or processing facilities
03/03/10	10	E7	Rick Wooldridge	Deleted "Definitions"
03/03/10	8.1.3	Jimmy Puckett	Rick Wooldridge	Information added to provide a single specific location that addresses LMP requirements...cause analysis will be performed to identify contributing factors and root causes of anomalies/deficiencies identify by corrosion control surveys.
03/03/10	6.4	Jimmy Puckett	Rick Wooldridge	Information added to provide a single specific location that addresses LMP requirements...All pipe to soil survey, rectifier inspection, and foreign line crossing pipe to soil potential data will be recorded in the appropriate corrosion control database. All close interval pipe to soil potential data will be recorded in a hard copy report as well as the appropriate electronic format, atmospheric inspection data and exposes pipe visual inspection data will be documented on the appropriate forms and distributed appropriately, and will feed into and be processed in overall LPSIP by populating appropriate portions of the relative risk model.
3/25/10	6.3	DOT	Rick Wooldridge	Modified: Records shall be maintained of each root cause analysis...to read Records shall be maintained for each analysis including root cause analysis.
8/9/10	2.3.4	E7 – Ken Lybarger	Rick Wooldridge	Changed Supervisor of Asset Integrity to Supervisor of Corrosion Control
8/9/10	2.10.4	E7 – Ken Lybarger	Rick Wooldridge	Changed Supervisor of Asset Integrity to Supervisor of Pipeline Integrity to maintain consistency with pipeline welding procedures.
08/09/10	All	E7	Rick Wooldridge	2010 annual review; 2.4.2 was simplified to say, " <i>Cathodic protection level should be evaluated utilizing Cathodic Protection Criteria</i> ". This change was necessary to improve/clarify the process for IR drop consideration. Deleted: "4.2.1 Products entering the system shall be sampled in accordance with D 4057-95 (2000) - Standard Practice for Manual Sampling of Petroleum and Petroleum Products, D 5842-95 (2000) -Standard Practice for Sampling and Handling of Fuels for Volatility Measurement, and D 4177-95 (2000) Standard Practice for Automatic Sampling of Petroleum and Petroleum Products". This change removes unnecessary and likely

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				incomplete information.
10/10/11	4.3.2.3	Rick Wooldridge	Doug Chabino	2011 Annual Review; Added: The frequency for routine cleaning operations of mainline crude piping should be 26 times per year, approximately every two weeks.
12/31/11	All			2012 Annual Review complete
2/16/12	4.3.2.3	Rick Wooldridge	Doug Chabino	Added clarification to facility piping